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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/008,653	11/09/2001	Fernando Gonzalez	98095DIV4	8023

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EXAMINER	
RICHARDS, N DREW	
ART UNIT	**PAPER NUMBER**
2815	

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/008,653	GONZALEZ ET AL.	
	Examiner	Art Unit	
	N. Drew Richards	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17,98-103,125,126 and 128* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17,98-103,125,126 and 128* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/7/04 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 17, 98-103, 125, 126 and 128 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Independent claims 17, 125 and 128 include limitations that the first and second pocket implant junctions are characterized by a non-uniform dopant profile. The specification as originally filed does not teach or disclose a non-uniform dopant profile and is in fact silent as to any specifics about the dopant profiles in the device.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 17, 98-103, 125, 126 and 128 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Independent claims 17, 125 and 128 include limitations that the first and second pocket implant junctions comprise an excess amount of dopant. These limitations render the claims indefinite as one of ordinary skill in the art would not be appraised of what level of dopant is necessary to achieve an "excess amount" as claimed. The claims do not define any requisite degree or amount of dopants so that one can determine what amount of dopants comprises an "excess amount". The specification also lacks any description on this matter so that one cannot look to the specification for clarification of this matter.

6. Insofar as definite, the claims are rejected over prior art as follows. For the sake of the art rejections below an "excess amount of dopant" is being provisionally interpreted to be any amount of dopant that is further added to the original doping of the substrate. However, confirmation of this interpretation by appropriate amendment is required.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 17, 98-101, 103, 125, 126 and 128 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moravvej-Farshi et al. ("Novel Self-Aligned Polysilicon-Gate MOSFETs with Polysilicon Source and Drain," Solid-State Electronics, Vol. 30, No. 10, 1987, Pp. 1053-62) in view of Wolf et al. ("Silicon Processing for the VLSI Era, Volume 3: The Submicron MOSFET," 1995, Pp. 232-240 and 309-311).

Moravvej-Farshi et al. disclose in figure 6 a raised drain structure (n+ poly), a raised source structure (n+ poly), a gate (n+ poly) located between the source and drain, a first capping layer (silicon dioxide on left half of figure) in communication with at least a portion of the gate and source, a first portion of a gate oxide region in communication with at least a portion of the gate and source, a second capping layer (silicon dioxide on right half of figure) in communication with at least a portion of the gate and drain, and a second portion of a gate oxide region in communication with at least a portion of the gate and drain. Moravvej-Farshi et al. do not teach a first pocket implant junction located in the substrate assembly and comprising an excess amount of dopant wherein the first pocket implant junction is characterized by a non-uniform dopant profile and extends under a first portion of the source and under a first portion of the gate. Nor does Moravvej-Farshi et al. teach a second pocket implant junction

located in the substrate assembly and comprising an excess amount of dopant wherein the second pocket implant junction is characterized by a non-uniform dopant profile and extends under a first portion of the drain and under a first portion of the gate.

Wolf et al. teach a transistor formed on a substrate assembly in figure 5-25(a), for example. Wolf et al. teach a source, drain, polysilicon gate between the source and drain, a gate oxide, and first and second pocket implant junctions. As seen in figure 5-25(a) P-type pocket implant junctions are formed in the substrate assembly that comprise an excess amount of dopant (the regions have more dopant than the P^- substrate) and extend under a first portion of the source (for the first pocket implant junction) and under a first part of the gate or under a first portion of the drain (for the second pocket implant junction) and under a second portion of the gate. These pocket implants are considered to have a non-uniform dopant profile as the dopant ions will undergo a degree of scattering during the implantation process and thus will have a peak dopant concentration at one location and a lesser concentration at a second location where the dopants were scattered to.

Moravvej-Farshi et al. and Wolf et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to form a first and second pocket implant junction as claimed. The motivation for doing so is to suppress punchthrough effects in a short channel device allowing for a shorter channel length without subsurface punchthrough. Therefore, it would have been obvious to combine Moravvej-Farshi et al. with Wolf et al. to obtain the invention of claim 17.

With regard to claim 98, the raised source is doped polysilicon.

With regard to claim 99, the raised drain is doped polysilicon.

With regard to claim 100, the gate is doped polysilicon.

With regard to claim 101, the source includes a plug.

With regard to claim 103, the gate includes a gate terminal as the entire gate structure is considered the gate terminal.

With regard to claim 125, Moravvej-Farshi et al. disclose in figure 6 a raised drain structure (n+ poly), a raised source structure (n+ poly), a gate (n+ poly) located between the source and drain, a first capping layer (silicon dioxide on left half of figure) in communication with at least a portion of the gate and source, a first portion of a gate oxide region in communication with at least a portion of the gate and source, a first outidffusion area (shown with dashed lines) located in the substrate assembly and extending under a second portion of the source, a second capping layer (silicon dioxide on right half of figure) in communication with at least a portion of the gate and drain, a second portion of a gate oxide region in communication with at least a portion of the gate and drain, and a second outdiffusion area (dashed line beneath drain) located in the substrate assembly extending under a second portion of the drain. Moravvej-Farshi et al. do not teach a first pocket implant junction located in the substrate assembly and comprising an excess amount of dopant wherein the first pocket implant junction is characterized by a non-uniform dopant profile and extends under a first portion of the source and under a first portion of the gate. Nor does Moravvej-Farshi et al. teach a second pocket implant junction located in the substrate assembly and comprising an

excess amount of dopant wherein the second pocket implant junction is characterized by a non-uniform dopant profile and extends under a first portion of the drain and under a first portion of the gate.

Wolf et al. teach a transistor formed on a substrate assembly in figure 5-25(a), for example. Wolf et al. teach a source, drain, polysilicon gate between the source and drain, a gate oxide, and first and second pocket implant junctions. As seen in figure 5-25(a) P-type pocket implant junctions are formed in the substrate assembly that comprise an excess amount of dopant (the regions have more dopant than the P^- substrate) and extend under a first portion of the source (for the first pocket implant junction) and under a first part of the gate or under a first portion of the drain (for the second pocket implant junction) and under a second portion of the gate. These pocket implants are considered to have a non-uniform dopant profile as the dopant ions will undergo a degree of scattering during the implantation process and thus will have a peak dopant concentration at one location and a lesser concentration at a second location where the dopants were scattered to.

Moravvej-Farshi et al. and Wolf et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to form a first and second pocket implant junction as claimed. The motivation for doing so is to suppress punchthrough effects in a short channel device allowing for a shorter channel length without subsurface punchthrough. Therefore, it would have been obvious to combine Moravvej-Farshi et al. with Wolf et al. to obtain the invention of claim 125.

With regard to claim 126, though Moravvej-Farshi et al. do not specifically teach forming the device of figure 6 as a P-channel device, it would have been obvious to one of ordinary skill in the art to form the device with opposite conductivity types than shown to form a PMOS. In doing so and applying the teaching of Wolf et al. to suppress punchthrough effects it would have been obvious to one of ordinary skill in the art to form the first and second pocket implant junctions with phosphorous. Wolf et al. teach doping with phosphorous in a PMOS device to form pocket implants on page 238, final paragraph.

With regard to claim 128, Moravvej-Farshi et al. disclose in figure 6 a raised drain structure (n+ poly), a raised source structure (n+ poly), a gate (n+ poly) located between the source and drain, a first capping layer (silicon dioxide on left half of figure) in communication with at least a portion of the gate and source, a first portion of a gate oxide region in communication with at least a portion of the gate and source, a second capping layer (silicon dioxide on right half of figure) in communication with at least a portion of the gate and drain, and a second portion of a gate oxide region in communication with at least a portion of the gate and drain. Moravvej-Farshi et al. do not teach a halo implant structure in the substrate assembly and comprising a first pocket implant junction and a second pocket implant junction, wherein the first pocket implant junction includes an excess amount of dopant and extends under a first edge of the gate, wherein the second pocket implant junction includes an excess amount of dopant and extends under a second edge of the gate, and wherein the first and second pocket implant junctions are each characterized by a non-uniform dopant profile.

Wolf et al. teach a transistor formed on a substrate assembly in figure 5-25(a), for example. Wolf et al. teach a source, drain, polysilicon gate between the source and drain, a gate oxide, and a halo implant structure in the substrate including first and second pocket implant junctions. As seen in figure 5-25(a) P-type pocket implant junctions are formed in the substrate assembly that comprise an excess amount of dopant (the regions have more dopant than the P^- substrate) and extend under a first portion of the source (for the first pocket implant junction) and under a first part of the gate or under a first portion of the drain (for the second pocket implant junction) and under a second portion of the gate. These pocket implants are considered to have a non-uniform dopant profile as the dopant ions will undergo a degree of scattering during the implantation process and thus will have a peak dopant concentration at one location and a lesser concentration at a second location where the dopants were scattered to.

Moravvej-Farshi et al. and Wolf et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to form a halo implant structure as claimed. The motivation for doing so is to suppress punchthrough effects in a short channel device allowing for a shorter channel length without subsurface punchthrough. Therefore, it would have been obvious to combine Moravvej-Farshi et al. with Wolf et al. to obtain the invention of claim 128.

9. Claim 102 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moravvej-Farshi et al. ("Novel Self-Aligned Polysilicon-Gate MOSFETs with Polysilicon

Source and Drain," Solid-State Electronics, Vol. 30, No. 10, 1987, Pp. 1053-62) with Wolf et al. ("Silicon Processing for the VLSI Era, Volume 3: The Submicron MOSFET," 1995, Pp. 232-240 and 309-311) as applied to claims 17, 98-101, 103, 125, 126 and 128 above in view of Iio et al. (U.S. Patent No. 6,130,482).

Moravvej-Farshi et al. teach a plug on the source but do not teach an adhesive layer included in the plug. The plug of Moravvej-Farshi et al. is taught as comprising aluminum and the source region is silicon. Iio et al. teach an aluminum plug in a contact hole where the aluminum plug contacts a silicon substrate (figure 3C, column 9 lines 38-46 and column 10 lines 35-50). Iio et al. teach forming a TiN adhesion/barrier layer between the aluminum plug and the silicon substrate.

Moravvej-Farshi et al. with Wolf et al. and Iio et al. are combinable because they are from the same field of endeavor. At the time of the invention it would have been obvious to a person of ordinary skill in the art to form an adhesion/barrier layer between the plug and the silicon source. The motivation for doing so is to prevent junction spiking (see Iio et al. column 10 lines 44-50). Therefore, it would have been obvious to combine Moravvej-Farshi et al. and Wolf et al. with Iio et al. to obtain the invention of claim 102.

Response to Arguments

10. Applicant's arguments with respect to claims 17, 98-103, 125, 126 and 128 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Drew Richards whose telephone number is (571) 272-1736. The examiner can normally be reached on Monday-Friday 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NDR

Tom Thomas

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